

# T-1044-2016a Data

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# PRDF

- No reason not to continue to use the same data format used in T-1044-2014:
  - Packet 21101 Format 1222 (IDHBD\_FPGASHORT)
  - 144 channels of 12 bit waveform digitizers
  - 24 samples, no zero suppression
  - Bipolar, average pedestal 2048
- Channel allocation in [docDB spreadsheet](#)
  - 64 channels EMCAL (high gain or low gain)
  - 32 channels Inner HCAL (high and low gain)
  - 32 channels Outer HCAL (high and low gain)
  - 16 channels fun and games (trigger, Cerenkov, coffee pot)
  - Can add more if needed (48 channel boards)

# Raw data

Packet 21101 1893 0 (Unformatted) 1222 (IDHBD\_FPGASHORT)

Number of Modules: 3 Parity: f03

Number of Samples: 12

Not correct

Module # 0 Trigger: 1314 Beam Clock: 1144 Module Id: 18

Module # 1 Trigger: 1314 Beam Clock: 949 Module Id: 2

Module # 2 Trigger: 1314 Beam Clock: 2698 Module Id: 28

0 | 2051 2051 2051 2051 2051 2051 2051 2051 2051 2051 2051 2051 2051

1 | 2051 2051 2051 2050 2050 2051 2050 2050 2051 2050 2050 2051

2 | 2049 2049 2049 2049 2049 2050 2050 2049 2049 2050 2050 2050

...

140 | 2046 2047 2046 2047 2046 2047 2046 2046 2046 2046 2046 2046

141 | 2048 2047 2048 2048 2048 2047 2048 2048 2048 2048 2048 2047

142 | 2049 2048 2048 2048 2048 2049 2048 2049 2048 2048 2048 2048

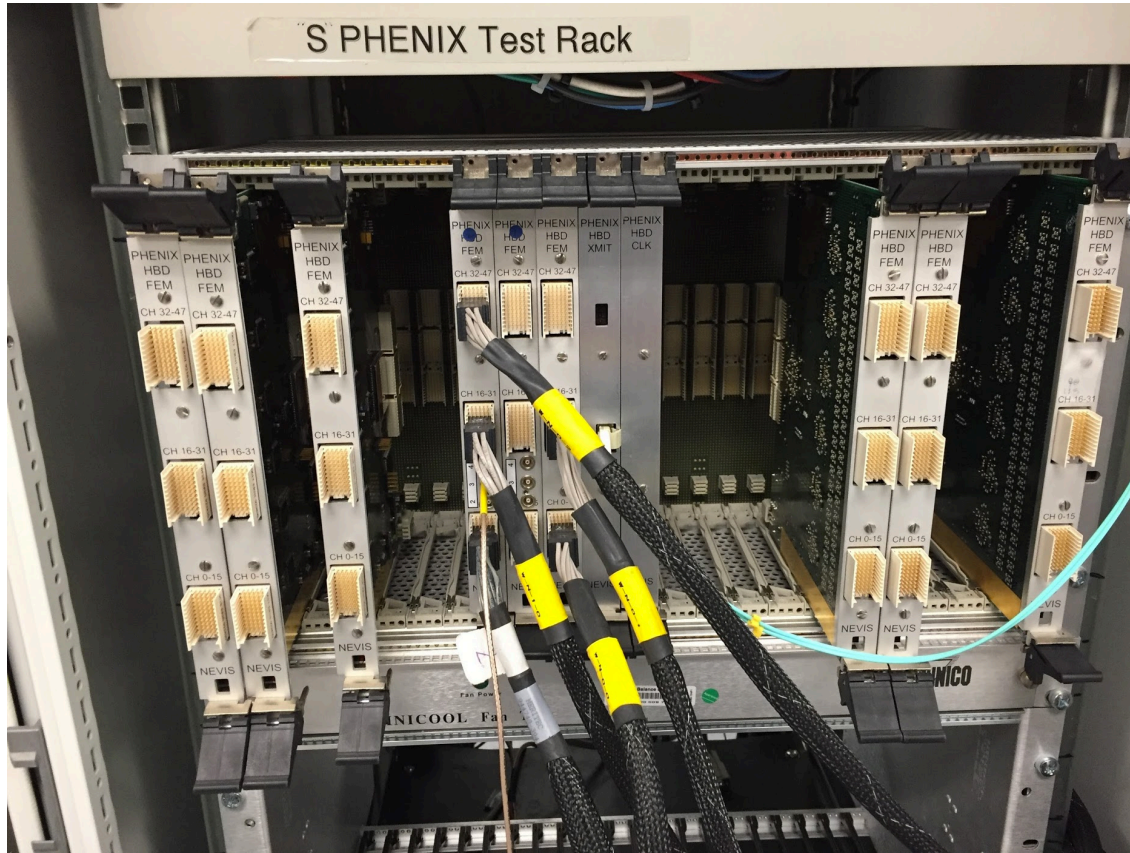
143 | 2049 2049 2049 2049 2049 2049 2049 2049 2049 2049 2050 2049

--- Debug block:

0 | 1 9172d4ce

--- DCM Checksum: 1

## What it looks like

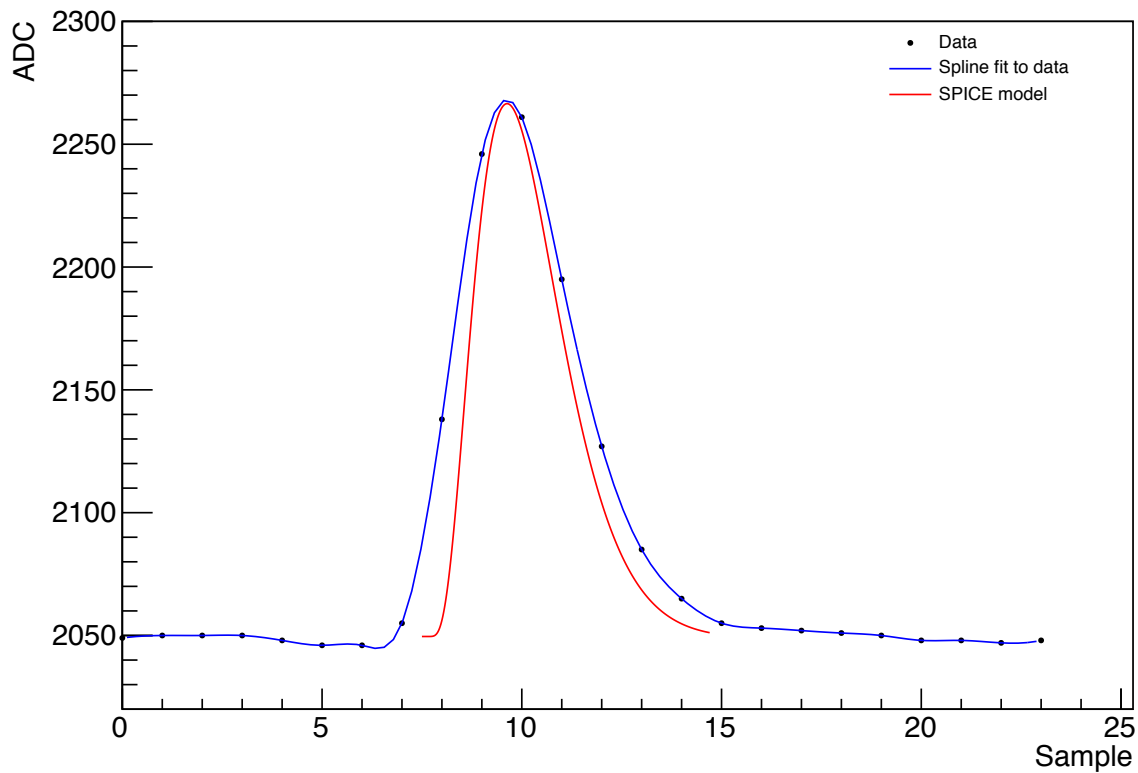


One fiber to DCM

9 16 channel connectors,  
right to left, bottom to top

# Preamplifier output

rc-01243-0.root adc[113] eventnumber == 14

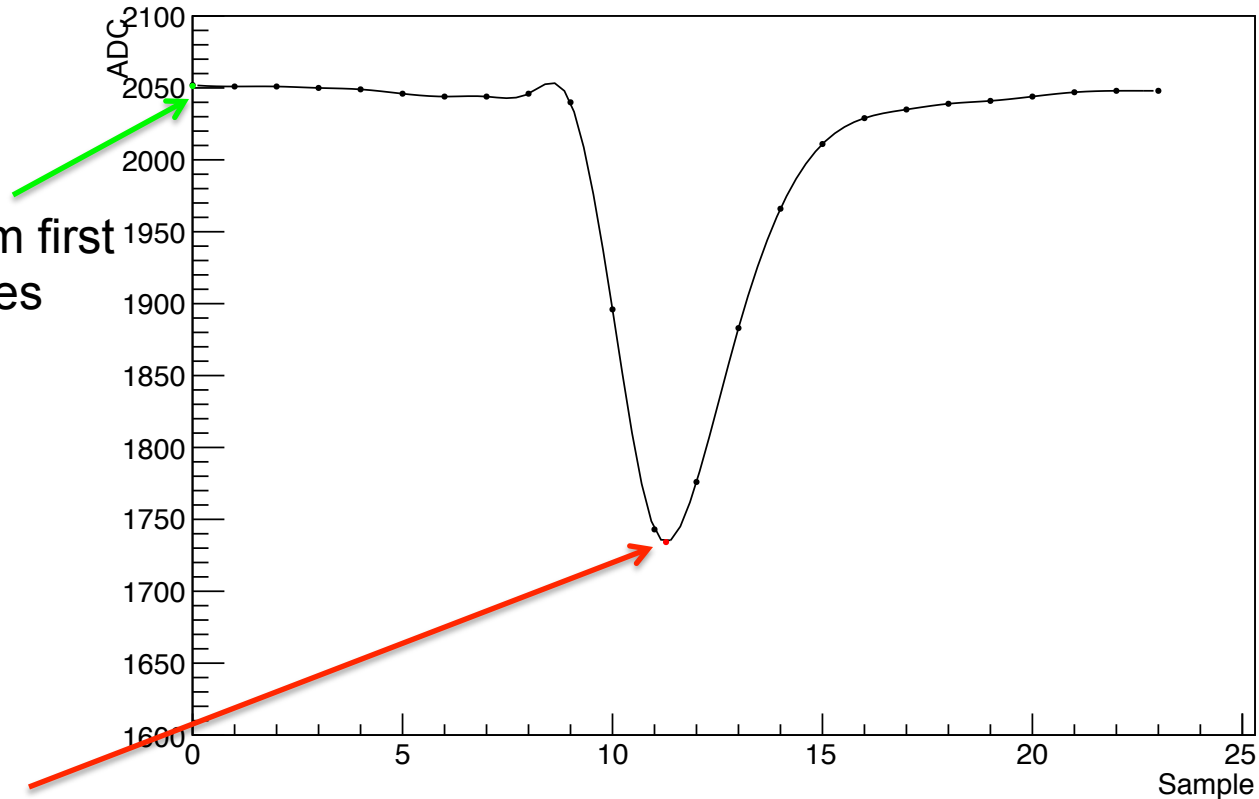


## My quick look

- Where's the data?
  - T-1044 2014 data: /sphenix/sim/sim01/user04/sphenix/t1044
  - HCAL lab data: /sphenix/sim/sim01/user04/sphenix/bnl/buffer
  - My TTree code: /sphenix/sim/sim01/user04/sphenix/bnl/wd40
  - Some TTree's: /sphenix/sim/sim01/user04/sphenix/bnl/wd40\_root
- I just copy the raw data into arrays and do a cubic spline fit to each channel and report the peak, time, integral, and pedestal
- But we should base the official analysis on a DST format that is pin-compatible with Monte Carlo data
- sPHENIX event libraries don't work on this data (yet, Martin is looking at it), but the PHENIX libraries do

# “Analyzed data”

rc-01194-0.root adc[112] eventnumber == 10



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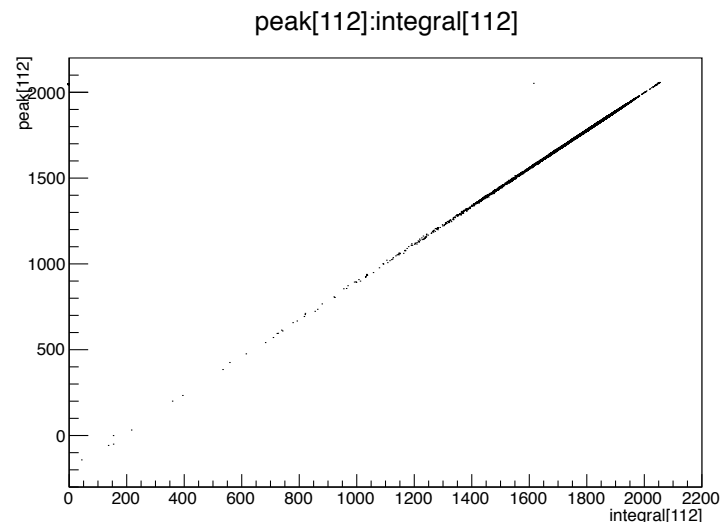
## Some things to be careful about

- Mapping
  - Megan and I have agreed to organize the channels in a way that makes the organization look completely obvious
  - That means the channel ordering is... systematic, but obscure
  - It's possible the mapping could change a little
- Signal is bipolar... Can change sign by plugging the Meritec cables upside-down. (Absolute value.)
- Miscellaneous signals from trigger counters and Cerenkov counters and whatnot need to be available as well
- Calibration... We need hooks for tower-by-tower calibration, but its designed that every tower is the same as every other tower in a detector (EMCAL?)
  - Certainly need to be make a sampling fraction corrected energy by detector



# Signal processing

- There isn't a lot of information beyond time and peak height, but that might not be true in sPHENIX
- Fits to template functions are "better," but they need some customization and probably aren't much different in the beam test
- I liked time in units of (floating) "samples" but ns is ok
- But be aware that  $t_0$  will jitter around event-to-event



## The new ADC

- Mathematically possible for the end of the beam test
- Not bipolar
- Different channel organization
- No experience yet with data format, timing, trigger
- Conceivable to mix with HBD data (but would need additional work)